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Road-based Urban Public Transport and Paratransit in Six Asian Countries: Legal Conditions and Intermodal Issues

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Abstract: In this study, we present an international comparative study on urban public transport and paratransit in six Asian countries. The paper focuses on benchmarking legal aspects and intermodal issues among existing urban paratransit, aiming for a better future policy in fulfilling the need of urban population growth. Results indicate that many modes are actually has not yet been legalized in the six countries. From the typology of typical paratransit modes, it is found that there are still paratransit modes with fixed route that might respond to the travel demand enough for sustaining route service if the vehicle size is minimized. Finally, there are many cases where BRT and other public transport projects face the issue of restructuring of existing public transport network mostly with bus mode. Development of intermodal facilities is considered as one of the solutions for overcoming the issue. It is also noted that common ticketing system, or integration in terms of systems, should be regarded as an important measure for promoting the integration.

Keywords: Comparative Study, Public Transport, Paratransit, Legal Condition, Intermodality

1. INTRODUCTION

In urban areas of both developed and developing countries, there are various types of travel demand that might be well served by private modes such as passenger cars and motorcycles. Travelers who do not have access to the private modes often need to use non-motorized or

public transport modes. As formal public transport modes, bus and taxi services are established in many urban areas. The bus mode usually services demand with fixed route and fixed schedule, which is usually less expensive but sometimes not considered as demand responsive, while the taxi mode usually services demand very flexibly at a much higher cost. It is intuitive that people could invent a new mode by combining advantages of these two modes. In fact, there are various types of the modes of this kind called *paratransit* in many urban areas especially in developing countries.

The number of past paratransit studies is not small. Cervero (2000) and Cervero and Golub (2007) compared urban paratransit modes in several cities of developing countries, and discussed relevant transport policy issues. Shimazaki and Rahman (1995, 1996) reviewed several paratransit modes in Asian countries from the viewpoint of physical and operational aspects. Joewono and Kubota (2005) summarized characteristics of paratransit as well as non-motorized modes in Indonesia. Phun and Yai (2015) gave a comprehensive review on paratransit literature in Asian developing countries and discussed their definitions, characteristics, and sustainability. However, the number of past studies that focused on legal conditions of paratransit is limited. While Cervero (2000) called paratransit as informal mode, there are many paratransit modes that are defined legally in direct or indirect manner. In this study, we conduct an international comparative study on the legal conditions of paratransit in urban areas of six Asian countries

Phun and Yai (2015) also included the discussion on the integration of urban paratransit mode with comprehensive urban public transport network. Okada *et al*. (2003) analyzed passengers' preference for improvement of railway stations in Manila, while Tangphaisankun *et al*. (2010) discussed paratransit mode as a feeder of mass transit system. Loo (2007) discussed the role of paratransit in Hong Kong, and Satiennam *et al.*(2006) studied the case of BRT introduction and the role of paratransit in Bangkok. While the issue of intermodality in relation to paratransit needs more attention, the focuses of past studies were mostly given on specific Asian megacities such as Manila, Jakarta, Hong Kong and Bangkok. In this study, we also collected the cases in relation to the intermodal issue of paratransit.

Taking the past literature above into consideration, in this study we conduct an international comparative study on urban public transport and paratransit in the following six Asian countries: Cambodia, Indonesia, Japan, Philippines, Thailand and Vietnam. We focus on legal conditions and intermodal issues in relation to paratransit, which will be helpful in generating urban public transport policy, including paratransit in urban areas of developing and developed countries. In addition, the purpose of the comparative study is for benchmarking, i.e. to get a possible minimum level of service standard for future urban paratransit, especially in ASEAN Countries. Urban paratransit shall be legalized and standardized, so that the passengers will feel safe and secure. This study is a part of IRG EASTS research, of which one of its objectives is to develop urban travel demand forecasting, especially on methodological development of optimizing the level-of-services of future new transit systems, considering both efficiency and equity issues.

Following this section, we review legal conditions of road-based urban public transport and paratransit in the six Asian countries. In section three, the typical paratransit modes in the six Asian countries are discussed, along with a summarized table indicating typology of paratransit, by which we might be able to discuss the relationship between legal conditions of paratransit and existing paratransit modes in real world. In section four, we focus on the intermodal issue in relation to urban public transport and paratransit. Finally, in section five we summarize conclusions and recommendations for further studies.

2. LEGAL CONDITION OF ROAD-BASED URBAN PUBLIC TRANSPORT AND PARATRANSIT IN SIX ASIAN COUNTRIES

In this section, we review legal conditions of road-based urban public transport and paratransit in the six Asian countries.

In Cambodia, the legal and regulatory framework for the transport sector remains at an early stage in its evolution, particularly for a sector-specific level. There is no legal specific definition of public transport and paratransit addressed in any regulatory framework, while the Land Traffic Law provides some general terms for road traffic flow. Public modes consist of bus, minibus and shared taxi for intercity transport, and paratransit and taxi for urban transport. Buses are mostly operated by private companies with fixed route and fixed timetable, whereas minibuses and shared taxis are mostly operated by individual operators with fixed route and non-fixed timetable.

The Land Traffic Law in Cambodia, which was first adopted in 2006 and later amended in 2014 with the aims for better road safety improvement, mainly focuses on sustaining the smooth and safe road traffic flow. This regulation has minimal impact on public transport and paratransit, as it only regulates driving license and vehicle registration (RGC, 2014). This lack of rules and regulations for governing and management of bus and paratransit results in various problems in many major cities concerning road safety and congestion, which were caused by inadequate facilities, inappropriate vehicles and irresponsible drivers. Even for Phnom Penh capital city, paratransit can operate freely in the market with little government control, while in such a situation the moto-remorque makes road traffic more congested and chaotic on the scare road space due to its obsolete physical characteristics with uncontrolled configuration of a carriage pulled by a motorcycle. Regarding the law enforcement, the police oversees road traffic and some other relevant activities under the Land Traffic Law and other legal tools in the framework to protect social order and security, and provide safety to the people. However, in practice the enforcement of the existing laws and regulations is not so tight due to some reasons such as the government officer (police) credibility, low salary, no financial support for the enforcement, etc.

In Indonesia, the Road Traffic and Transportation Act Number 22 of 2009 Article 158 states that the government is responsible and shall guarantee the availability of highway-based mass transit to fulfill the needs of people in urban areas. The mass transit shall be in the form of bus, which has special lanes, and whose route shall not overlap with previous angkot and other feeder line routes.

The legal basis for road-based public transport modes in Indonesia is Transportation Minister Regulation Number 74 of 2014. The regulation states the type of highway public transport in permanent and non-permanent routes. The permanent route consists of across country borders bus (e.g. with Malaysia and Timor Leste), inter-city inter-province bus, inter-city inside-province bus, urban transport (angkot), and rural transport (angdes). According to this regulation, public passenger road-based transport mode with fix route in Indonesia shall fulfill the following criteria: (1) It has a fixed route and regular service; (2) It has a schedule; and (3) It starts, ends, and picks up passengers in the terminal (for inter-city transport and across country borders), and picks up passengers at the specified places (for urban and rural transport) which are terminal, bus stops and sign stops for public transport.

Moreover, road-based public transport route network and the number of fleets are determined based on spatial planning, the demand for transport services, the ability to provide fleets, the availability of road traffic and road transport network, compliance with the road classification, and the integration both for intermodal and intramodal transport. On the other hand, the types of road-based public transport with non-fix route consist of taxis, becak

(pedicab), motorcycle taxi, bicycle taxi, and delman (horse-drawn cart). The motorcycle taxi and bicycle taxi is nationally illegal; however, some cities has locally legalized.

In Japan, the Ministry of Land, Infrastructure, Transport and Tourism (MLITT) administers policies and development in relation to public transport. It also administers the relevant Acts in relation to each public transport mode. Bus transport including Bus Rapid Transit (BRT) and other land public transport modes are regulated by the Road Transportation Act (RTA).

After the major amendments to RTA in 2006, under the section 4 of RTA, there are three types of general shared passenger road transportation business. First, the fixed route and fixed timetable business includes bus, community bus and shared taxi modes. Second, the fixed route and non-fixed timetable includes community bus, shared taxi and demand responsive transit (DRT) modes. Third, area operation business or remaining business also includes community bus, shared taxi and DRT modes. There is no legal definition of paratransit mode in Japan; however, if the paratransit mode is defined as the mode with non-fixed route or non-fixed timetable, some of the community bus and shared taxi modes and all of DRT mode are classified as the paratransit modes in Japan.

Under the section 4 of RTA, there are also two types of general chartered passenger transportation business. First, chartered bus mode is defined as the business with the capacity of 11 persons or more including a driver. Second, taxi mode is defined as the business with the capacity of 10 persons or less including a driver. Finally, limited passenger transportation business is also regulated by the section 4 of RTA whose passengers are limited to the employees of a particular company or the people with disabilities. Under the section 78 of RTA in Japan, there are three types of private passenger transportation business. They include registered bus mode operated by municipal government, registered transportation mode for underpopulated area, and registered transportation mode for welfare. Some of the private passenger transportation modes are classified as paratransit mode from the viewpoint of non-fixed route or non-fixed timetable.

In the Philippines, with respect to public transportation policy, planning and development, the Philippine Department of Transportation and Communications (DOTC) is the lead agency through its road transport and rail transport planning offices. Bus Rapid Transit (BRT) is a new public transport mode that will be first introduced in Cebu City in the following years. Legal and institutional arrangements that will govern this mode are yet to be instituted. The Public Service Act (Commonwealth Act No. 146) of 1936 in Philippines is the main law that regulates public transport which covers fare regulation and quality of service. It is the basis to which franchises or Certificate of Public Convenience is required for public services. Road-based public transportation except for three-wheelers is defined in Table 1 by the Land Transportation Franchising and Regulatory Board, the agency under the DOTC that regulates road-based public transport. Most urban public transport services in the country have no fixed timetable.

In Thailand, bus and minibus modes are regulated by Land Transport Act, B.E. 2522 in 1979, while taxi, motorcycle taxi, and tuk-tuk by Motor Vehicle Act, B.E. 2522 also in 1979. The current framework, the Land Transport Act B.E. 2522 in 1979 cannot adequately address changes in transport system in the country. It also does not promote the development of integrated transport networks, nor even deal with urban growth in regional cities.

Table 1. Classification of road-based public transport

Classification	Seating Capacity	Body Make	Route/Stops/Type of Service
Public Utility Bus	50	Bus	Fixed route, regular, limited-stop or express/ordinary or air-conditioned
Public Utility Mini-Bus	30-49	Bus	Fixed route, regular, limited-stop or express/ordinary or air-conditioned
Public Utility Jeepney	12-32	Jitney type	Fixed route, regular
Filcab Regular	7-11	Mini-Jitney/ Multicab	Fixed route
Taxi	4	4-door or 5-door automobiles	From one origin point to any point in the island/air-conditioned
UV Express Service	10-20	Asian Utility Vehicle (AUV), Van, Coach	Fixed route, terminal to terminal/air-conditioned

Source: Land Transportation Franchising and Regulatory Board (2013)

Paratransit modes in Bangkok, Thailand such as passenger vans and small converted pick-up trucks has arisen in the past due to increasing demand and insufficient and inefficient formal public transport. They were formerly registered for private usage, but many of them are running for hire illegally, picking up passengers and competing with other formal public transports. Choocharukul and Sriroongvikrai (2011) investigated several aspects of small-sized converted pickup trucks in Metropolitan Bangkok and found that illegal operations such as illegal route extension and unauthorized routes are still observed, although the Department of Land Transport has regulated and set up a specific task force since 2005. It was recommended that these modes should run complimentarily with the formal public transport modes like bus and urban rail systems. However, a proper and stringent regulatory framework is still necessary.

In Vietnam, except for traditional buses which must have at least 17 seats, other small sized passenger cars are not considered as legal paratransit mode. Decision No 63/2014/TT-BGTVT permits operation of <16 seat vehicles as feeder modes for fixed routes of operators. However, operators are not allowed to charge additionally the fare of fixed routes. Some cities and provinces want to continue operating small sized vehicles as feeder modes for buses as such vehicles are suitable for small collector roads. So there are expectations of changes in policy regarding the operation of small sized paratransit modes in Vietnam.

According to Act No. 91/2009/NĐ-CP in Vietnam, buses are passenger cars that have more than 16 seats and have 0.125 square meter floor area per passenger for standing. They can run intra cities or between 2-3 provinces, and must have fixed routes and fixed stops for boarding and aligning, and fixed time-table. Maximum service headway should be less than 30 minutes for intra city buses. The stop spacing should be less than 700m in urban area and 3000m in suburban area and the outside. The Act defines taxis as passenger cars that have less than 9 seats. The car should have “Taxi” lamp mark on its roof and have route and schedule as demanded by passengers. Taxi fees are charged based on meters.

Besides regular bus and taxi, there is another type of transit service in Ho Chi Minh City that uses 12-seat vehicles as mentioned above. This kind of vehicles does not meet the conditions to run transit service as defined by Act No. 91/2009/NĐ-CP. However, because Ho Chi Minh City had invested many 12-14 seat vehicles before the issuant of Act No. 91/2009/NĐ-CP, the City Committee has allowed the continued operation of these irregular buses until the end of vehicle life cycle. The small sized bus is suitable for operation in small roads. Thus they are used as school buses or in local routes and can be considered as paratransit modes. This kind of bus service has fixed route, fixed time-table, and fixed stops. However, stops for this kind of buses are sometimes changed unexpectedly and the buses are

not equipped with any facilities.

Table 2 summarizes legal definitions of urban public transport and paratransit in six Asian countries. While some urban public transport modes are not legalized for example passenger vans and small converted pick-up trucks in Thailand, many modes are actually legalized. There are some modes for example 12-seat bus in Vietnam that are located between legal and illegal transport modes.

Table 2. Legal definitions of urban public transport and paratransit in six Asian countries

Definitions	Cambodia	Indonesia	Japan	Philippines	Thailand	Vietnam
Modes	bus	BRT	bus, community bus, shared taxi		bus, minibus	Regular bus
shared, fixed stops, fixed route, fixed timetable		Section 3 Road Traffic and Transportation Act: Passenger Public Transport with fixed route	Section 4, Road Transportation Act: general shared passenger road transportation business, the fixed route and fixed timetable business Section 79, Road Transportation Act		Land Transport Act, B.E. 2522 (1979)	Section 5, Road Transportation Act: Bus transportation business Section 13, 14 Road Transportation Act: Conditions for bus and fixed route passenger transportation bussiness
Modes		bus	community bus, shared taxi, DRT			12-seat bus
shared, non-fixed stops, fixed route, fixed timetable		Section 3 Road Traffic and Transportation Act: Passenger Public Transport with fixed route	Section 4, Road Transportation Act: general shared passenger road transportation business, the fixed route and fixed timetable business Section 79, Road Transportation Act			Section 5, Road Transportation Act: Bus transportation business Section 13 Road Transportation Act: Conditions for bus and fixed route passenger transportation bussiness,
Modes	small open truck[1)]	Minibus (angkot)	community bus, shared taxi, DRT	bus, jeepney, UV Express		intercity bus
shared, non-fixed stops, fixed route, non-fixed timetable		Section 3 Road Traffic and Transportation Act: Passenger Public Transport with fixed route	Section 4, Road Transportation Act: general shared passenger road transportation business, the fixed route and non-fixed timetable business Section 79, Road Transportation Act	Public Service Act; Land Transportation Franchising & Regulatory Board Memorandum Circulars		Section 13 Road Transportation Act: Conditions for bus and fixed route passenger transportation bussiness,
Modes		travel minibus	community bus, shared taxi, DRT	tricycle		
shared, non-fixed stops, non-fixed route, non-fixed timetable		Section 3 Road Traffic and Transportation Act: Passenger Public Transport with non-fixed route	Section 4, Road Transportation Act: general shared passenger road transportation business, area operation business Section 79, Road Transportation Act	Public Service Act; Land Transportation Franchising & Regulatory Board Memorandum Circulars; local government ordinances		
Modes	taxi, moto-remorque, motorcycle taxi, cyclo	taxi, motorcycle taxi, bicycle taxi and pedicab	taxi	taxi	taxi, motorcycle taxi, tuk-tuk	taxi
non-shared, non-fixed stops, non-fixed route, non-fixed timetable		Section 3 Road Traffic and Transportation Act: Passenger Public Transport with non-fixed route (only for taxi), motor cycle, bicycle taxi and pedicab is locally regulated	Section 4, Road Transportation Act: general chartered passenger transportation business	Public Service Act; Land Transportation Franchising & Regulatory Board Memorandum Circulars	Motor Vehicle Act, B.E. 25	Section 5, Road Transportation Act: Bus transportation business Section 15 Road Transportation Act: Conditions for taxi bussiness

Note: 1) Mostly used by suburban factory employees to and from the garment factories.

3. TYPOLOGY OF ROAD-BASED URBAN PUBLIC PARATRANSIT IN SIX ASIAN COUNTRIES

In this section, we discuss the typical paratransit modes in the six Asian countries and Table 3

Table 3. Typology of typical paratransit modes in six Asian countries

Cambodia	Indonesia	Japan	Philippines	Thailand	Vietnam
Small Open Truck	Angkot	Shared Taxi	Jeepney	motorcycle taxi	12-seat bus
S, NP, R, NT	S, NP, NT, R	S, NP, T, R	S, NP, NT, R	NS,NP,NT,NR	S, P, T, R
Moto-remorque	motorcycle taxi	DRT	Filcab	Converted pick-up trucks	motorcycle taxi
NS, NP, NR, NT	NS, NP, NT, NR	S, NP, NT, NR	S, NP, NT, R	S,P,NT,R	NS, NP, NT, NR
motorcycle taxi	Horse-drawn Cart		UV Express	Passenger van	
NS, NP, NR, NT	NS, NP, NT, NR		S, NP, NT, R	S,P,NT,R	
Cyclo	bicycle taxi, Ojek		Tricycle	Tuk-tuk	
NS, NP, NR, NT	NS, NP, NT, NR		S, NP, NT, NR	NS,NP,NT,NR	
	Pedicab				
	NS, NP, NT, NR				

Notes: S:Shared/NS:Non-Shared, P:Fixed Stops/NP:Non-fixed Stops,

T:Fixed Timetable/NT:Non-fixed Timetable, R:Fixed Route/NR:Non-fixed Route)

indicating typology of paratransit, by which we might be able to discuss the relationship between legal conditions of paratransit and existing paratransit modes in real world.

3.1 Cambodia

In Cambodia, paratransit modes consist of motorcycle taxi, moto-remorque and cyclo (Table 3). They are operated by individual operators with non-fixed route and non-fixed timetable, whereas taxicabs are mostly operated by private companies. Besides, some small size open trucks, operated by individual operators with fixed route and non-fixed timetable, are also used as a form of informal public mode for suburban factory employees to and from the garment factories.

Motorcycle taxi locally known as Motodop is the most common and fastest form of informal public transport and used widely everywhere. Motodop typically carries one passenger with additional one or two more passengers, but when the new land traffic law comes into force, they will be limited to two adults and one child.

Moto-remorque is a two-wheeled carriage pulled by a motorcycle which is widely used as a form of informal public transport in Cambodia. It is originally born from a small trailer pulled by a bicycle which was eventually replaced by a motorcycle for added speed and less effort, and now widespread referred as tuk-tuk of Thailand. The configuration of the carriages and motorcycles is varied, in which the regular stylized carriage with rooftop is common in major cities that can comfortably seat four passengers, while the bigger and long types without rooftop is common in suburb and some small urban areas that can seat up to 20 passengers. Such a kind of moto-remorque is not used only for public transport but also for private and freight transport, of which the type for public transport has better configuration and good looking, whereas the one for private and freight transport especially for informal business operations is really chaotic on road traffic flow with uncontrolled carriage modified accordingly to user utilities. Moreover, another type of compact configuration with a cabin compartment fixedly attached to a motorcycle resembling a motorized rickshaw is not usually used for public transport but for transporting goods.

Cyclos are three-wheeled, pedal powered vehicles with the driver sitting behind a seat that has a cover that can be raised in rainy weather. The seat is large enough for two passengers. Cyclos are used as a form of informal public transport in Phnom Penh and some other major cities, and causes a significant disturbance to the traffic flow on major roads due to its low speed.

3.2 Indonesia

There are some paratransit modes operated in Indonesia: Angkutan Kota or Angkot (City minibus), motorcycle taxi or ojek, bicycle taxi, becak (pedicab) and delman (horse-drawn cart). Except Angkot, all the paratransit modes have non-fix route while all the paratransit modes have non-schedule and no specific stopping area. Paratransit route line determination is one of the very important issues, since the government shall establish route lines which can reach as many as possible passenger, taking into account load factor of paratransit. If the paratransit load factor indicates more than 0.7 (70%), the government will give an effect of new permit letter for new fleets, otherwise there will be no additional fleet allowed to operate in existing routes. This rule not only applies to Angkot but also to all the fix-route road-based public transport modes. Determination of paratransit route lines is also related to the issue of transport costs, and in this case the government must establish route change system that will minimize additional travel costs to users.

Angkot as a paratransit mode is run and managed by individuals, cooperatives, and private owners, mostly operating as a single-person enterprises. The tariffs for Angkot in Malang City for example is Rp. 4000 for normal fare and Rp. 3000 for students. The role of the government, performed by the municipal authorities in charge, is to issue Angkot permit letter to operate on selected designated routes and decide upon the number of fleet that operates for each designated route. The driver has to sign a contract to pay a fixed amount of money to the owner on a daily basis (called as "setoran" system). Wicaksono (2008) has identified the disadvantage of this daily payment system, including the race among Angkot to get more passengers. Recently, this paratransit system has faced great competition with motorcycles and private cars. The ease of buying motorbikes through a leasing system lets many people own a motorcycle, thus making the paratransit in Malang City and all the Indonesian cities less attractive. There are also many Angkot's accident cases that happen in most of the cities of Indonesia, such as Medan, Jakarta, Bandung, Yogyakarta and Surabaya.

The recent popular flexible taxi is a motorcycle taxi called as "Ojek" as an informal public transport in Indonesia. This motorcycle taxi in term of national regulation is illegal, because its existence is not recognized by the Indonesian government and no permission is given on their operation, except that certain local government makes specific regulation on motorcycle taxi. The capacity of the "Ojek" is for one person, though sometimes two people can be transported. The cost of "Ojek" is determined by bargaining, and the driver can deliver passengers faster and it is convenient during the rush-hour traffic congestion in the city. In cities like Jakarta, there is also bicycle taxi, which is using bicycle instead of motorcycle. The cost of using bicycle taxi is, of course, cheaper than motorcycle taxi.

The Delman is a traditional horse-drawn cart with two or four wheel using the horse as the power. Normal capacity carriage is for 4 passengers, although sometimes it might be used by 6-8 passengers. Delman is currently widely used in the attraction for tourists in a certain city like Yogyakarta.

Table 3 also shows a 3-wheel rickshaw/pedicab transport modes commonly used in Indonesia. Normal capacity rickshaw is for 2 passengers with the driver being behind the passenger. Pedicab is an environmental-friendly means of transportation because it does not cause air pollution, gives less-noise pollution and can also be made as a tourist attraction. Recently, the presence of urban pedicab can disrupt traffic because of its slow speed compared to motorcycles; therefore, some pedicab drivers try to modernize the vehicle by applying motorcycle engine to power the pedicab.

3.3 Japan

In 2009, the Act on Revitalization and Rehabilitation of Local Public Transportation Systems (ARRLPTS) institutionalized the local public transport comprehensive coordination committee in Japan. The committee is generated by prefectural or municipal governments and must be consulted when the paratransit mode whose vehicle capacity is 10 persons or less is introduced in most cases. The Act is expected to promote the use of the paratransit mode. In Japan in relation to the paratransit mode, there are three types of modes that might possibly be called paratransit mode: community bus, shared taxi and DRT modes. In Japan, legal definitions for the three modes are not available; they are overlapped in terms of classification. For example, some of the shared taxi modes are called as community bus modes. Since most of the community bus modes, which usually use smaller bus vehicle, operate like bus mode with fixed route and fixed timetable, the shared taxi mode and DRT are reviewed.

The shared taxi uses a smaller vehicle with the capacity of 10 persons or less than a bus. An example of a shared taxi vehicle, 'Migon by Aoi Traffic Corporation in Komaki City,

Aichi Prefecture' is shown in Table 3 for illustrative purpose. The shared taxi responds to particular travel demand such as the demand between airport and downtown and the demand during midnight when rail and bus modes are not available. It also responds to travel demand which is not enough to sustain bus mode with fixed route and fixed timetable. While some of shared taxi modes operate like bus mode with fixed route and fixed timetable, some operate with non-fixed route, non-fixed timetable, or non-fixed stops.

The DRT uses a variety of vehicle types in response to the size of travel demand which should be met by the mode. Because of demand responsiveness, it operates in response to the reservation by the user, which necessarily results in the operation with non-fixed route, non-fixed timetable, or non-fixed stops. While there are some exceptions, DRT modes have been introduced in the areas where travel demand was too low for bus mode with fixed route and fixed timetable. An example of a DRT vehicle, 'Odaka e-Machi Taxi by Odaka Commerce and Industry Association in Minamisoma City, Fukushima Prefecture' (currently suspended due to nuclear power plant accident) is shown in Figure 3 for illustrative purpose.

3.4 Philippines

In the Philippines, there are two classes for buses, including the public utility bus (PUB) and a public utility mini-bus service with same route, stop and type of service but with almost narrow distinction in terms of seating capacity. If seating capacity reaches 50, it is classified as PUB and from surveys, seating capacities range from 56 to 61. With respect to stopping, city operation buses can practically stop anywhere along its route except in areas prohibited by local governments and/or the Metro Manila Development Authority (MMDA) in the case of Metro Manila. Along certain major corridors, there are bus stops designated by the MMDA and local governments. In Metro Manila, route lengths range from 3 kilometers to 55 km.

Public utility Jeepney have lower seating capacities ranging from 12 to 32 with average seating capacity of 20 to 22. It can be noted that the upper seating capacity limit overlaps with the lower seating capacity limit of the public utility mini-bus. Like the bus, Jeepney can stop anywhere along its route except for areas prohibited by the local government and/or MMDA, as in the case of Metro Manila. Along certain major corridors, there are Jeepney stops designated by the MMDA and local governments. Ceiling route length is set at 35 km. Public utility Jeepney are mostly made from surplus or secondhand engines and parts with operation by small-scale or individual operators. The entrance and entry to the Jeepney is mainly at the back except for few newer types called jumbo Jeepney. Majority of the Jeepney are ordinary or without air-conditioning.

A smaller version of the Jeepney that are more common in cities in Visayas and Mindanao, called Filcab Regular, is made from surplus multicabs with seating capacity of 7 to 11 with no air-conditioning and entrance is at the back. Its operation is similar to the public utility Jeepney. Ceiling route length is set at 15 km. and should not compete with higher–occupancy public utility vehicles on majority of the route.

UV Express vehicles are mostly made of Asian Utility Vehicles (AUV) and vans (e.g. Toyota Revo, Mitsubishi Adventure, Isuzu Crosswind, Toyota Hi-Ace, Nissan Urvan) with fixed route and terminal-to-terminal services. It is supposed not to pick up passengers along its route but practice is otherwise. It is allowed to deviate from its route by some specification since the franchise is based on the route ends. Route lengths range from 5 to 45 kilometers in Metro Manila and it could be greater in the regional areas.

The tricycle, another mode of paratransit, is the three-wheeler public transport which serves feeder to the four-wheeler public transport. Its body is usually composed of a motorcycle fitted with a sidecar. Seating capacity is set at 6 by the national agency, the Land

Transportation Office. Regulation on entry and exit and operations has already been devolved to the local government units since 1991. Operations of tricycles are generally area-based and they do not have fixed routes and are supposed to have terminals where they originate and terminate and are not allowed to pass through national highways. However, in reality, one could observe tricycles plying national roads. There are also non-motorized three-wheelers called pedicab that are used for public transport in some municipalities and these are regulated by local governments. The make is usually a bicycle fitted with a sidecar.

3.5 Thailand

The passenger vans in Thailand are regulated by the Department of Land Transport (DLT) under the Land Transport Act B.E. 2522 in 1979. License requirements such as designated route, origin and destination, minimum and maximum number of vehicles to be used, and fares are set by the Central Land Transport Control Board (CLTCB), which is a regulatory board for land transport from the Land Transport Act. In Greater Bangkok area, these passenger vans are operating as joint operators under the Bangkok Mass Transit Authority (BMTA).

The motorcycle taxis serving trips in Bangkok areas are regulated by both the DLT and the Bangkok Metropolitan Administration (BMA). Their operating license must be obtained from DLT and must be registered with BMA's district office. According to the DLT Regulation on Registration of Public Motorcycle Taxis B.E. 2548 (2005), the fare amount cannot exceed 25 Baht for the first two kilometers and 5 Baht per kilometer for the rest of the trip. The fare, however, can be negotiated when the trip length is longer than 5 kilometers.

Tuk-tuk or Sam-lor is another typical example of the three-wheeler public transport. The mode is governed by Motor Vehicle Act, B.E. 2522 in 1979. Tuk-tuk is a kind of motorbike taxi with a small cabin and its fare is determined on negotiation basis. The number of tuk-tuk vehicles is expected to decrease partly because of competition with private modes such as car and motorbike as well as other types of public transport with higher quality.

3.6 Vietnam

In Vietnam, among buses, the 12-16 seat buses are proposed for an extension of use by the Governments of some cities as we discuss in the previous section. This kind of vehicle are said to be suitable to operate on narrow streets and small bridges in cities, as well as to be highly accessible for passengers. Therefore, they are considering modifying such small size vehicle to respond to regulations on passenger cars. Thus, this mode is speculated to increase its service in near future as a replacement for conventional large size buses.

Motorcycle taxi is still an official paratransit mode. People still find it useful, though its market share has decreased gradually due to the increase of private mode use. Unlike those in Bangkok, motorcycle taxis in Ho Chi Minh City and other cities in Vietnam are not regulated and controlled by the government, possibly because its operation and safety is similar to the majority of motorcycles and this mode is a living tool for a minority part of poor people.

3.7 Typology of Typology of Typical Paratransit Modes in Six Asian Countries

Table 3 indicates typology of typical paratransit modes in six Asian countries. They are indexed according to Shared/Non-Shared, Fixed Stops/Non-fixed Stops, Fixed Timetable/Non-fixed Timetable, and Fixed Route/Non-fixed Route. While Cervero (2000) argued that most paratransit modes were considered as informal, most of the paratransit

modes are legalized in each country. In the six Asian countries, motorcycle taxi is prevailing, there are still paratransit modes with fixed route that might respond to the travel demand less enough for sustaining formal bus mode, but enough for sustaining route service if the vehicle size is minimized. This is the case for some urban areas where long narrow collector roads prevail and prohibit formal bus operators from servicing the areas in Thailand and Vietnam, and where travel demand is scarce so that small sized vehicle is suitable for meeting the demand from the viewpoint of social welfare in Japan.

4. INTERMODALITY AND ROAD-BASED URBAN PUBLIC PARATRANSIT IN SIX ASIAN COUNTRIES

In this section, we discuss intermodal issue in relation to urban public transport and paratransit. While paratransit modes arise in order to meet the travel demand that formal urban public transport modes such as bus and taxi cannot provide efficiently, it is more desirable to integrate the paratransit modes into a comprehensive urban public transport network in the urban area. Among the six Asian countries with urban public transport and paratransit modes, the issue is commonly identified; however, it is also considered as one of the most difficult tasks to tackle. In this section, we selectively discuss intermodal issues and some solutions to them that are found among the countries in this study.

4.1 Restructuring of Existing Public Transport Network with BRT

In Indonesia, the Directorate General of Land Transportation gives initial investment fund for building new BRT system in all the cities. For example, in the organization structure of TransJakarta Company, the implementation body is the Jakarta Municipal Government while the operation body is BLU Transjakarta Company, which is a public authority under the Transportation Agency of the Jakarta Municipal Government. BLU TransJakarta Company manages the whole operation of the TransJakarta system, including overseeing the bus operation, which is run by nine different bus companies. Some of the bus operators were formed from existing bus companies whose routes overlapped with TransJakarta corridors, while the others were individual operators selected from a competitive tendering process. Typically, buses are purchased and owned by the bus operators; however, at the beginning the Directorate General of Land Transportation bought some fleets and gave them to BLU TransJakarta Company. Operators are paid per bus kilometer travelled throughout their seven years of operating contract period thus passing the financial and revenue risks to the municipality.

In Vietnam, several projects to build BRT routes have been approved and construction will be implemented in near future. Under the Ho Chi Minh City (HCMC) Department of Transport, there are two agencies that regulate the operation and planning of public transport. They are Public Transport Operation and Management Center (PTOMC) and Bus Operation and Management Center (BOMC). The BOMC is responsible basically for developing and operating of all bus routes, for bidding for the rights to run a subsidized bus route and for building and maintaining bus facilities. For BRT project development, the PTOMC could be the Project Management Unit who is responsible for building the infrastructure for the service as well as coordinating the BRT lines with existing bus routes. There are state owned bus companies, private companies and cooperatives that follow regulations and condition issued by PTOMC. Among those bus operators, state owned companies account for one fifth of market share. These state owned companies are not only economic units but also agencies that

support the city public transport policies. For example, when BRT lines are developed and built, state owned bus companies will be transferred to run those BRT lines.

In the planning of the Cebu Bus Rapid Transit (BRT) in the Philippines, the feasibility study considered coordination between the BRT system and Jeepney routes in Cebu City, where possible transfer stations or opportunities between the BRT systems and Jeepney routes have been identified and mapped.

In Japan, before the amendments to the ARRLPTS institutionalized local public transport network formation plan in 2014, there was no major institutions for coordinating among public transport modes. Minor exceptions might include coordination cases when a station square or a bus terminal is built; however, the coordination is limited to the site specific elements in these cases.

The lack in the coordination among public transport modes from the viewpoint of network often causes failure in introducing new public transport system in the area where other forms of public transport mode was existing. For example, the first section of Chiba Urban Monorail was opened in 1988 and the full section was in 1999 in Chiba City, which is located within about 40km from the central Tokyo. After the opening, the number of passengers was found to be much less than predicted, which resulted in major revisions on the project. According to the study, one of the reasons why the number of passengers could not attain the forecast number was the failure in coordination between Monorail and existing bus modes. While the existing bus modes directly connected between suburban residential areas and Chiba rail station, the route of the Monorail was C-shaped so that it took more time to connect between two areas. The project assumed coordination between newly introduced Monorail and existing bus modes; however bus companies refused to follow the plan of coordination.

One of the objectives for the amendments to the ARRLPTS in 2014 in Japan is to institutionalize local public transport restructuring implementation plan. It is noted that after the acceptance of the plan by the Minister of MLITT, general shared passenger transportation business in the plan area might possibly be limited or changed by the order if the maintenance of the plan is found to be difficult and relevant public benefit is possibly decreased considerably. It takes time to see if the local public transport restructuring implementation plan works; however, the institutionalization of the plan makes a legal way for coordination among public transport and possibly paratransit modes.

There have been many cases where BRT and other public transport projects face the issue of restructuring of existing public transport network mostly with bus mode. While the framework has not been established, the issue was overcome on a case by case basis. In Japan, where the background is different from other countries, the framework is legalized partly because it includes social welfare problems.

4.2 Intermodal Facilities and Other Aspect

In the Philippines, with respect to urban transport, planning is done by individual agencies with no effective integration mechanism and even integration within a mode difficult with agencies (departments, authorities, government owned and controlled corporations, local governments) having overlapping functions. Furthermore, there are still no guidelines on metropolitan transport planning. It has been observed earlier in 2008 that one general issue in transport and traffic management in Philippine cities is the lack of public transport terminals or if there are, they are ineffective. In Metro Manila, integrated terminals for inter-city buses have just started to be developed, which is already relatively late compared to Cebu City and other cities in the country such as Cagayan de Oro and Iligan that have already had such

terminals. It can also be observed that for urban transport there is a lack of coordination between public transport modes such as light rail and paratransit modes as well as between paratransit modes in terms of transfer facilities. In some corridors, it can be observed that bus/light rail transit routes and Jeepney routes overlap and essentially compete with each other.

In Cebu City, two public transport terminals have been constructed, i.e. the Cebu South Bus Terminal in 1992 and the Cebu North Bus Terminal in 1994. The operation of the two public transport terminals has helped ease traffic congestion due to limiting buses accessing the road to the center of the city. This has also helped establish the hierarchy of transport modes. Complementing this is the City Ordinance 2000 amending the travel lines of public transport vehicles enforced through the local traffic management authority that has strengthened local government involvement in public transport management. In Cagayan De Oro City, there are also two existing terminals (Westbound Integrated Bus Terminal in Bulua and Eastbound Integrated Bus Terminal in Gusa), while there are also two terminals in Iligan City (North Terminal in Hinaplanon and South Terminal in Tomas Cabili). Although the Cagayan de Oro terminal system has shown relative success, there are operational concerns such as the presence of barkers and undisciplined drivers and operators, sanitation, government subsidy and the choice of strategic location for the terminal. In Iligan City, the south terminal is still temporary in nature and there are important issues such as terminal capacity, provision of amenities and financial sustainability and also the choice of the strategic location.

In Thailand, in terms of public transport integration, a common ticketing system should be implemented; however, no such scheme is available at present. For instance, commuters who would like to connect their trip between the BTS sky train and the MRT underground train have to purchase the ticket separately. Likewise, bus services are not integrated with the rail network. To cope with this issue, the Office of Transport and Traffic Policy and Planning (OTP) has set up the Common Ticketing Office (CTO) to develop common tickets and appropriate joint transit fares. The project has been studied with the implementation of the central clearing house and is expected to be available in the near future. After the completion of urban rail network and common ticketing system, it is expected that passengers can travel more seamlessly and the proportion of public transport users would be higher.

Development of intermodal facilities such as bus terminal and rail station plaza is considered as one of the solutions for overcoming the issue of integrating road-based urban public transport and paratransit modes into comprehensive public transport network in urban area. EMBARQ (2010) has identified the better services of integrated intermodal facilities between BRT and other transport modes in Beijing and Guadalajara, and they recommended to other city to provide such integration. Since the agreement between Japanese Ministry of Construction and Japan National Railways in 1972, the station plaza have been constructed according to the guideline which regards the plaza as the intermodal connection among railway, bus and taxi. The formal agreement has much contributed to development of public transport network by constructing a railway station as an intermodal node. It is also noted that common ticketing system, or integration in terms of systems, should be regarded as an important measure for promoting the integration between urban public transport and paratransit modes.

5. CONCLUSIONS AND FURTHER STUDIES

In this study, we conduct an international comparative study on urban public transport and

paratransit in six Asian countries: Cambodia, Indonesia, Japan, Philippines, Thailand and Vietnam. We focus on legal conditions and intermodal issues in relation to paratransit, which will be helpful in generating urban public transport policy including paratransit in urban areas of developing and developed countries.

In conclusions, first, while some urban public transport modes such as passenger vans and small converted pick-up trucks in Thailand are not legalized, many modes are actually legalized according to legal conditions in the six countries. There are some modes like the 12-seat bus in Vietnam that are located between legal and illegal transport modes.

Secondly, from the typology of typical paratransit modes, it is found that motorcycle taxi is prevailing; however, there are still paratransit modes with fixed route that might respond to the travel demand less enough for sustaining formal bus mode, but enough for sustaining route service if the vehicle size is minimized. This is the case for some urban areas where long narrow collector roads prevails and prohibits formal bus operators from servicing the areas in Thailand and Vietnam, and where travel demand is scarce so that small sized vehicle is suitable for meeting the demand from the viewpoint of social welfare in Japan.

Finally, there have been many cases in Indonesia, Vietnam and the Philippines where BRT and other public transport projects face the issue of restructuring of existing public transport network mostly with bus mode. Since the framework for this has not been established, the issue was overcome on a case by case basis. In Japan, where the background is different from other countries, the framework is legalized partly because it includes social welfare problems.

Development of intermodal facilities such as bus terminal and rail station plaza is considered as one of the solutions for overcoming the issue of integrating road-based urban public transport and paratransit modes into a comprehensive public transport network in urban area. The cases of bus terminal are found in Indonesia and Philippines, and rail station plaza in Japan. It is also noted that common ticketing system, or integration in terms of systems, like the initiative in Thailand should be regarded as an important measure for promoting the integration.

For further studies, in order to understand characteristics of paratransit deeply, more legal conditions in relation to urban public transport in other countries should be collected. In relation to intermodal issues, in this study we did not collect significant number of cases where restructuring of existing public transport network or development of intermodal facilities were conducted. In relation to the restructuring, the mechanism for involving and persuading existing public transport operators for integrating them into comprehensive public transport network is worth further studying.

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